

White children more likely to receive CT scans than Hispanic or African-American children

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White children are more likely to receive cranial (head) CT scans in an emergency department following minor head trauma, compared with African-American or Hispanic children, a study published by researchers at UC Davis has found.

The study findings do not indicate that CT (computed tomography) scans are underused in African-American and [Hispanic children](#). Rather, the researchers suggested that white [children](#) may receive too many CT scans and thus may be exposed to unnecessary radiation.

The results are online and appear in the August issue of the *Archives of Pediatrics & Adolescent Medicine* in an article titled, "Cranial computed tomography use among children with minor blunt [head trauma](#): Association with race/ethnicity."

"We found that although the use of CT scans was appropriate across all racial groups for those children at higher risk of a brain injury following apparently minor head trauma, for children with only minimal risk, CT was overused in white children," said JoAnne E. Natale, associate professor of pediatric critical care medicine at UC Davis School of Medicine and the study's lead author, who presented her preliminary findings at the American College of Emergency Physicians Scientific Assembly last October.

"In many instances, doctors appear to be responding to parental anxiety rather than medical evidence," Natale said.

Cranial CT scans are commonly used in emergency departments for children and adults after head trauma to determine whether bleeding or swelling is occurring in the brain, conditions that could be life threatening. These scans use radiation to image the cranium, brain, eye sockets and sinuses. Studies have found that there are potential long-term consequences of CT radiation, particularly for children who are more vulnerable to the cancer-causing effects of radiation.

Natale and her colleagues analyzed data collected from the cases of about 40,000 children who were identified as Hispanic, non-Hispanic African American, or non-Hispanic white. Although all of the children had minor head trauma, some could be categorized as being at greater risk of a clinically significant injury and thus requiring a CT scan based on clinical prediction rules. In each case, physicians documented reasons that were most important in influencing the decision, including medical indications as well as non-medical criteria such as parental anxiety or request.

The researchers found that the children's race and/or ethnicity did not have an effect on the likelihood of receiving a CT scan in children who were at the greatest risk of a clinically important brain injury; all groups received appropriate diagnostic imaging. However, among lower-risk pediatric patients, white children were more likely to receive a CT scan than were African-American and Hispanic children. In 12 percent of the cases involving white children (with the lowest risk of clinically important brain injury), emergency room physicians cited parental anxiety or parental requests as among the most important criteria in prompting them to order a CT. For the corresponding group of black and Hispanic children, physicians cited parental anxiety/requests in only about 5 percent of pediatric cases involving CT scans for the lowest risk

of brain injury.

"Our findings highlight that medically irrelevant factors can affect physician decision-making in a way that could harm the patient," said Natale, who also is the medical director of the UC Davis Children's Hospital Pediatric Intensive Care Unit. "This underscores the need for ensuring optimal care for all patients by supporting sound clinical decision-making based on strong empirical evidence."

The risk of malignancy from CT radiation, particularly in children, has been reported in several studies. A recent article published in *The Lancet* addressed potential long-term consequences of the radiation from CT scans. It found that children who get two or three CT scans before age 15 triple their risk of developing brain cancer and triple their risk of developing leukemia if they get five to 10 scans. The study noted, however, that the absolute risk of developing cancer remains very small and is outweighed by the benefits of CT if it is indicated.

Although a CT scan is clearly indicated in children following moderate or severe head trauma, the indications are less clear for children with minor trauma and depend on whether certain clinical factors are present. In 2009, UC Davis researchers writing in *The Lancet* developed a set of rules for identifying low-risk patients who would not need a CT. The "prediction rules" for children under 2 and for those 2 and older depended on the presence or absence of various symptoms and circumstances, including the way an injury was sustained, a patient's history of loss of consciousness, neurological status at the time of evaluation and clinical evidence of a skull fracture, among other findings.

Both *The Lancet* study and the current investigation utilized data compiled through a collaborative research effort led by Nathan Kuppermann, senior author of the race/ethnicity article and chair of the

UC Davis Department of Emergency Medicine. Under the auspices of the Pediatric Emergency Care Applied Research Network (PECARN), the original study enrolled more than 42,000 children with minor head trauma who were seen at 25 U.S. emergency departments around the nation between 2004 and 2006.

"Because of the large numbers of children studied in PECARN emergency departments, this extensive network has made possible numerous studies that would not otherwise be feasible, that answer pressing questions that previously were difficult to study," said Kuppermann, who is a professor of pediatrics and emergency medicine. "The results of these studies are changing the way we care for children."

Kuppermann's research, published in the 2009 *Lancet* article, found that CT scans are not necessary for children at very low risk of clinically significant traumatic brain injury. Based on that study, two algorithms were devised (one for children younger than 2 years, the other for those 2 years and older) with specific criteria to guide physicians in deciding whether a CT is necessary for minor head trauma, such as the presence of factors such as altered mental status, history of loss of consciousness, severe headache, signs of skull fracture and vomiting.

"Minor head trauma is extremely common in the pediatric population," said Kuppermann. "It is important to use evidence to avoid the inappropriate use of CT and potentially induce harm later in life."

In addition to the increased risks posed by radiation exposure, overuse of CT scans in [white children](#) also has impacts on overall health-care costs. Natale added that the overuse of such scans is part of a well-documented pattern of providing more care than is necessary to some patients, which in turn places additional burdens on health-care costs.

More information:

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